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PATENT

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Application No.: Not Yet Assigned Art Unit: 1754

Filed: Herewith Examiner: S. Hendrickson

For: METALLIC CATALYTIC PARTICLE FOR  
PRODUCING SINGLE-WALLED CARBON NANOTUBES (AS AMENDED)

Box PATENT APPLICATION  
Commissioner for Patents  
Washington, D. C. 20231

PRELIMINARY AMENDMENT

Applicant herein seeks to amend the above application as shown below pursuant to Rule 37 CFR 1.115, prior to the first examination and action of the United States Patent and Trademark Office.

Submitted herewith for the Examiner's review is a Clean Version of the amended specification and a corresponding Marked-Up version of the specification (redline) filed in accordance with 37 CFR 1.125(b).

Also submitted herewith is a Complete Application for Publication which includes all amendments to the specification and claims, in accordance with CFR 1.215(c), for purposes of publication. No new matter is being introduced with the new submission of the substitute specification.

Therefore, please approve the amendments to the application as follows:

**In the Drawings:**

Please accept the formal Black and White photographs and drawings filed herewith.

**In the Specification:**

Please approve the amendments made to the specification as shown in the marked-up version of the specification. Also submitted herewith is a clean version of the specification which incorporates all of the amendments shown in the marked-up specification (redline).

**In the Claims:**

Please cancel claims 2-36.

Please amend claim 1 submitted below in a clean version of the amended claims pursuant to 37 CFR 1.121(c)(1)(i), as follows:

1. (Once Amended) A metallic catalytic particle for selectively producing single-walled carbon nanotubes, comprising:

Co and Mo in a ratio of one part Co to at least two or more parts of Mo; and

a support material, and wherein the Co, Mo and support material are combined to have a particulate form.

Please add the following new claims 37-60.

37. (New) The metallic catalytic particle of claim 1 further comprising an additional Group VIII metal.
38. (New) The metallic catalytic particle of claim 1 further comprising an additional Group VIb metal.
39. (New) The metallic catalytic particle of claim 1 wherein the support material is selected from the group consisting of silica, MCM-41, alumina, MgO, ZrO<sub>2</sub>, aluminum-stabilized magnesium oxide, and molecular sieve zeolites.
40. (New) The metallic catalytic particle of claim 1 comprising from about 1% to about 20% by weight of Co and Mo.

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41. (New) A metallic catalytic particle for selectively producing single-walled carbon nanotubes, comprising:  
at least one of Ru, Rh, Pd, Ir, Pt, at least one Group VIb metal, and a support material, combined to have a particulate form.
42. (New) The metallic catalytic particle of claim 41 wherein the at least one Group VIb metal is selected from the group consisting of Cr, Mo and W.
43. (New) The metallic catalytic particle of claim 41 comprising Ru.
44. (New) The metallic catalytic particle of claim 41 comprising Rh.
45. (New) The metallic catalytic particle of claim 41 comprising Pd.
46. (New) The metallic catalytic particle of claim 41 comprising Ir.
47. (New) The metallic catalytic particle of claim 41 comprising Pt.

48. (New) The metallic catalytic particle of claim 41 wherein the support material selected from the group consisting of material of silica, MCM-41, alumina, MgO, ZrO<sub>2</sub>, aluminum-stabilized magnesium oxide, and molecular sieve zeolites.

49. (New) The metallic catalytic particle of claim 41 comprising from about 1% to about 20% by weight of the at least one Ru, Rh, Pd, Ir and Pt and the at least one Group VIb metal.

TOP SECRET - 100%

50. (New) A metallic catalytic particle for selectively producing single-walled carbon nanotubes comprising: at least one Group VIII metal, excluding Fe, at least one of Cr, Mo and W, and a support material, and wherein the Group VIII metal, the at least one of Cr, Mo and W, and the support material are combined to have a particulate form, excluding a metallic catalytic particle consisting of the support material and Co and W or Co and Mo.

51. (New) The metallic catalytic particle of claim 50 wherein the at least one Group VIII metal is selected from the group consisting of Co, Ni, Ru, Rh, Pd, Ir and Pt.

52. (New) The metallic catalytic particle of claim 50 comprising Cr.

53. (New) The metallic catalytic particle of claim 50 comprising W.

54. (New) The metallic catalytic particle of claim 50 comprising Mo.

55. (New) The metallic catalytic particle of claim 50 wherein the support material selected from the group consisting of material of silica, MCM-41, alumina, MgO, ZrO<sub>2</sub>, aluminum-stabilized magnesium oxide, and molecular sieve zeolites.

56. (New) The metallic catalytic particle of claim 50 comprising from about 1% to about 20% by weight of the at least one Group VIII metal and the at least one of Cr, Mo and W.

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57. (New) A metallic catalytic particle for selectively producing single-walled carbon nanotubes, comprising:  
Co and Mo in a ratio of one part Co to at least two or more parts of Mo, and a silica support material, wherein the Co, Mo and silica support material are combined to have a particulate form.
58. (New) The metallic catalytic particle of claim 57 further comprising an additional Group VIII metal.
59. (New) The metallic catalytic particle of claim 57 further comprising an additional Group VIb metal.
60. (New) The metallic catalytic particle of claim 57 comprising from about 1% to about 20% by weight of Co and Mo.

**REMARKS**

Prior to the first examination on the merits, please amend the specification and claim 1 as indicated, cancel claim(s) 2-36 without prejudice and add new claims 37-60. Claims 1 and 37-60 are now pending in the application.

The present application is a continuation of U.S. Serial No. 09/389,553, now allowed and is directed in particular to a metallic catalytic particle for selectively producing single-walled carbon nanotubes. Claim 1 has been amended and claims 2-36 have been cancelled without prejudice and replaced with new claims 37-60.

An examination on the merits is hereby requested.

**Marked-up Version of Claims**

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "Version with markings to show changes made".

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

1. (Once Amended) A [method] metallic catalytic particle for selectively producing single-walled carbon nanotubes, comprising:

[contacting, in a reactor cell, metallic catalytic particles consisting essentially of a Group VIII metal, excluding iron, and a Group VIb metal with an effective amount of a carbon-containing gas at a temperature sufficient to catalytically produce carbon nanotubes, wherein a substantial portion of the carbon nanotubes are single-walled nanotubes.]

Co and Mo in a ratio of one part Co to at least two or more parts of Mo; and

a support material, and wherein the Co, Mo and support material are combined to have a particulate form.